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ABSTRACT

This local assessment identifies the strengths and weaknesses of the science program at El Paso Community College and uses these findings to make recommendations for long-range planning for the science program. Four types of questionnaires were developed: one for students, one for institutional-occupational program directors, one for science faculty, and one for comparing responses of program directors and science faculty on course objectives. Analysis of the results produced the following conclusions: (1) The present science curriculum content is generally appropriate for current occupational program offerings; (2) Support services, particularly counseling, need to be correlated to science offerings; (3) Laboratory work adequately complements classroom activities; and (4) Laboratory facilities and usage generally fulfill program needs. The assessment also indicated that the science curriculum needed to be expanded, particularly in the area of new courses required to meet occupational program objectives and in the area of remedial courses in the sciences. (Author/SK)

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TECHNICAL REPORT

LOCAL ASSESSMENT OF SCIENCE EDUCATION
IN TWO-YEAR COLLEGES (EL PASO
COMMUNITY COLLEGE)

SE 034 041

TABLE OF CONTENTS

	<u>Page</u>
Rationale for Study	1
Objectives	1
Methodology Employed	2
Findings	
Objective A	3
Objective B	5
Objective C	5
Objective D	6
Discussion	6
Recommendations	10
Specifies	11
Appendices	
AI -Questionnaire for Student Survey	15
AII -Questionnaire for Program Directors	20
AIII-Questionnaire for Science Faculty	23
AIV -Questionnaire for Program Directors and Science Faculty	28
B -Findings of Student Survey	37
C -Findings of Program Directors Survey for Science Course Assessment	61

	<u>Page</u>
DI -Findings of Biology Faculty Survey	68
DII-Findings of Chemistry Faculty Survey	81
E -Findings of Comparison Between Program Directors & Science Faculty	94

TECHNICAL REPORT

Institution and Address:

El Paso Community College
Post Office Box 20500
El Paso, Texas 79998

National Science Foundation Program:

Local Assessment of Science
Education in Two-Year
Colleges, (TYCLASE)

Program Period:

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Program Number:

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Rationale for Study

It was the intent of this program, supported by the National Science Foundation via the priority of Local Assessment of Science Education in Two-Year Colleges to conduct an assessment of the science program at El Paso Community College in El Paso, Texas. The paramount objective of the program was to identify strengths and weaknesses in the science program and to utilize these findings to formulate long range planning recommendations for the science program of the college.

Objectives

The objectives of the program were:

- (1) to determine whether parent science curriculum content is appropriate to current program offerings.
- (2) to determine whether support services are correlated to science offerings.
- (3) to determine whether laboratory work complements classroom activities.
- (4) to determine whether laboratory status and usage fulfill program needs.

Methodology Employed

Questionnaires were developed in consultation with the Office of Research, Development and Evaluation and the Office of Learning Resources (Education Development Specialists). One questionnaire was developed for students, one for institutional occupational program directors, and one for science faculty. A fourth instrument which compared program directors and science faculty responses on course objectives was also developed. All questionnaires except the students' were broken down by discipline.

The questionnaires combined both close- and open-ended questions which afforded the opportunity for multiple response and also the opportunity to express opinions on specific topics. The close-ended part of the questionnaire for students was developed with a computer format to facilitate analysis of the responses.

The data were collected, collated and analyzed. Frequency of response was used to summarize findings of the data, except in the fourth instrument which compared program directors and science faculty responses. For these responses each objective was scored by the assigning point(s): three points for heavy emphasis, two points for moderate emphasis, one point for light emphasis, and zero for no coverage. This produced a scale score between three and zero for every objective for every respondent. The scores were then added together for each objective and averaged.

The findings of the conduct of the program follow, and are presented per respective objective as responded by the various populations surveyed. The questionnaires used in the study are presented in Appendix AI through A IV.) Findings of the student survey are presented in Appendix B.

Appendices C,D, and E present the results for the program directors and science faculty survey respectively.

Findings

OBJECTIVE A: - to determine whether present science curriculum content is appropriate to current program offerings.

Almost three fourths of the students responding to the questionnaires were enrolled at the El Paso Community College as full-time students and they were majoring in liberal arts. Their educational goal was to finish a two year program at EPCC and transfer to a four year college. Over half of the allied health students were completing science courses in order to meet occupational program requirements; whereas, vocational technical students were mainly interested in improving their existing job skills. Fifty-eight percent of the students indicated that they were either "very satisfied" or "satisfied" with this educational experience in the science offerings. In addition, almost two thirds of the students indicated that the science offerings they had completed had immediate as well as long-term direct benefits. Student responses indicated that their science preparation prior to EPCC was generally acceptable to allow successful completion of science offerings at the college. Also the students stated that the science courses completed at the college properly prepared them for completing respective program requirements. Eighty-nine percent of the Voc-Tech, 78% percent of Liberal Arts students expressed their science course preparation for occupational program requirements as "good" or "very good." Voc-Tech program directors indicated that students' preparation in chemistry, physics, and math as "weak" whereas Allied Health program directors

responded that students' preparation in chemistry, biology, physiology, and microbiology as "average" and math as "weak".

Thirty percent (30%) of the Voc-Tech program coordinators and 19% of Allied Health directors indicated that the reason why their students are not adequately prepared in science or math was "inappropriate science and math course objectives". Thirty seven percent (37%) of Allied Health directors and 10% of Voc-Tech program coordinators agree that inadequate preparation was due to "lack of relationship of subject matter to program needs". Twenty percent (20%) of Voc-Tech 19% of Allied Health directors showed that "inadequate developmental courses in sciences" is one of the reasons why students are not adequately prepared in Science.

In short, 68% of occupational program directors showed that inappropriate or inadequate course objectives, and lack of relationship of subject matter to program needs may be one of the reasons why students are not successful in their program. On the other hand, 47% of students responded that the reasons why science courses failed to prepare students for their programs were inadequate or inappropriate course objectives. The science faculty, on the other hand, felt that the introductory science courses were attempting to be too diverse and thereby not meeting individual program or student needs.

According to the findings of comparison between program directors and science faculty responses on course objectives, there were some differences in emphasis on each course objective: 35% of biology, 33% of microbiology and physics course objectives were based on equal to or greater than 1.0 point (0.0 to maximum 3.0 weighted scale) between two groups or among three groups (allied health program directors, science faculty, and Voc-Tech program directors).

Generally the present science or math course curriculum content is appropriate to the current occupational program offerings based on the results of the surveys. However, efforts are needed to review more in depth the science curriculum to determine more specifically where science courses and program needs can be more closely related.

OBJECTIVE B. - to determine whether support services are correlated to science offerings.

In assessing the various institutional support services, the students surveyed rated the audio-tutorial laboratory as "good." Developmental studies and library holdings were also rated good; however, tutoring services were generally rated as "poor."

One of the areas of concern voiced by the three populations surveyed was counseling. Students in the occupational programs expressed the desire that counseling and program needs be better correlated. Students receiving advise from program directors felt such advise was adequate. Students pursuing liberal arts and transfer courses also indicated a need for better counseling concerning the science offerings. The latter opinion was strongly supported by the science faculty. Program directors and science faculty also expressed the need for a more correlated counseling service.

OBJECTIVE C. - to determine whether laboratory work complements classroom activities.

Although this objective was not specifically addressed in the instrument design, the principal investigator's perceptions are that there is a serious attempt to have the laboratory complement the lecture. These perceptions were obtained by observations and consultations with individual science faculty members.

OBJECTIVE D. - to determine whether laboratory status and usage fulfill program needs.

The science faculty was the target population surveyed to assess this objective. The faculty responded in terms of the availability of the laboratory space. The main concern was that the traditional scheduling of the laboratory (i.e. in blocked times) did not allow for any flexibility in the utilization of the available laboratory space. The innovative design of the building is being used traditionally, and thereby contradicting the available intent of the space. Some science faculty indicated that the number of students in a lab should not be over 20-24 students in order to have an adequate learning environment. However, the present status and usage generally fulfill the current occupational programs.

Discussion

The type of institution tends to determine the characteristics of its science program. EPCC may be characterized as an open door, comprehensive, community college. The concept of opening the doors to the sciences for all the students is a consequence of this philosophy.

The "open door" means entry into the college is generally unrestricted. It also means that many courses and many programs of study must be available. Some courses will be within the range of a student's interest and some beyond his ability. The student need not choose what lies outside his interest; however, a student would not be allowed to choose that which clearly lies beyond his ability. Unfortunately, many administrators and faculty do not realize that the open door college does not require every program of study and course to be openly available. It does require a variety of programs and courses to match the potentials and interest of a variety of students.

"Comprehensive" means a commitment to a multiplicity of educational functions or purposes. Six functions may be considered: (1) education for transfer or the lower-division parallel function; (2) education for occupational competence, or career training function; (3) education for living, or general education function; (4) counseling and guidance; (5) community educational services and continuing education; (6) education for overcoming deficiencies, or remedial, or salvage function.

The "community" concept arises because the college is partially governed by local authorities, receives financial support from local sources, and is relatively low in cost compared to other higher educational institutions. Furthermore, the college desires to respond quickly to the educational needs of the community and with extended day and weekend scheduling of classes is able to educate and train all segments of the community from 18 to 80 years.

To fulfill the function of education for occupational competence the College must prepare its students to enter gainful employment upon completion of a two-year course of study and with a reasonable chance of succeeding

and advancing. There is currently much interest in and concern about engineering technicians, science technicians and allied health personnel, who are generally classified as semi-professionals. They represent one part of a continuous spectrum of scientific and technical jobs for which the two-year college must train and educate students.

This spectrum has four broad bands. The first band includes craftsmen or skilled tradesmen; the second, highly skilled or industrial technicians; the third, semi-professionals or engineering and scientific research technicians; and the fourth, professional engineers and scientists. The band boundaries are diffused rather than discrete. The bands are characterized, as one moves from the craftsman to the professional, by increased complexity and intellectual content of the job demands. EPCC must develop programs which will train each group in what they are required to do on the job and educate them in what they are required to know to perform effectively in their jobs. The provision for the professional is a part of the transfer function.

The implication for the science faculty of EPCC is that they must provide the science components of the programs of study for the craftsman, the highly skilled, and the semi-professional if the college is to fulfill its occupational and educational function. There must be as great a concern about the integrity of these programs as for the transfer and occupational students, but also educational experiences of a generalized nature to citizens of the county who have neither a high educational degree nor a career educational goal.

The counseling and guidance function is significant because the college is obliged to provide a multiplicity of programs for a heterogeneous

student body. We have to deal with students who come in and say, "I want to be a chemist, "I want to be an engineer," or "I want to be a doctor," even though this may or may not be a realistic goal.

This implies that the science faculty at EPCC must develop a philosophy and program for placement of students in the science courses at the place where the student has the most reasonable chance of succeeding and where he will obtain the education and training in science best suited for his educational goals. The two-year college situation is such that students should not be allowed to enter a college level program when they obviously are not ready and will probably "sink." There is considerable evidence from other colleges that through counseling, guidance, and remedial programs large numbers of students can be salvaged and thereby succeed in "swimming" the whole distance.

The community service and continuing education function requires that EPCC identify all of the educational needs related to science within the county, be they highly specialized or general, and respond to these needs by providing, or participating in suitable educational programs. For example, this may require the development of a series of specialized courses, or programs related to one or more of the sciences such as a nuclear science course or a water chemistry program, or it could involve a science lecture series.

The salvage function and the implications related to providing remedial programs in the sciences have been previously mentioned.

The conduct of this needs assessment has indicated that: (1) the present science curriculum content is generally appropriate to current occupational program offerings: (2) The support services are

not as correlated to science offerings as they could be; (3) laboratory work complements classrooms activities; and (4) the laboratory status and usage fulfill program needs.

The conduct of this needs assessment provided an opportunity for occupational program directions, science faculty and students to objectively evaluate the science offerings of El Paso Community College that has, since its inception in 1971, offered only a relatively small number of courses in the science disciplines. The assessment indicated that although the science offerings were generally adequate for present needs, the science curriculum needed expansion: (1) development of new courses which are adequate to meet occupational program objectives and (2) development of remedial courses in the sciences. Also adequate counseling in science offerings, prompt prerequisite enforcement, and maximum laboratory utilization are needed for subsequent for future science courses.

Recommendations:

In order to move the science program closer to that which it should be (i.e. achieving a proper balance between transfer, occupational, general education, remedial, counseling and guidance, continuing education, and other educational services to the El Paso County) this study proposes the following recommendations. First, that the recommendations be viewed in the context of the operation of the overall system and various sub-systems and thus be compatible with the planning and governance system and not in isolation.

Secondly, that a long range plan be developed for the curriculum, instructional and other educational science programs, which would require a minimum of three or a maximum of five years to develop and implement.

Specifics:

1. In order that the instructional systems and the facilities at Valle Verde Campus can realize their fullest potential for meeting the needs of students, it is imperative that lecture rooms be located near the science laboratories and storage areas to facilitate various teaching methods. This space should be planned so that instructors can conduct lecture-type experiments and demonstrations, and thus use a wide variety of three-dimensional and media materials.

The development of the science curriculum for EPCC must be viewed in terms of the open-door, comprehensive, community philosophy and the six functions mentioned earlier. To fulfill the education for transfer function the College must provide a well-rounded or complete lower-division college program for persons who desire to continue their education in an academic or professional discipline such as chemistry, physics, biology, and engineering. Some students cannot qualify for the university upon high school graduation, but are potentially capable of obtaining a baccalaureate degree and often a doctorate.

The College must also provide an opportunity for the unqualified, ineligible or unsure student to demonstrate the capacity to maintain, over an extended period, an acceptable standard of scholarship in subjects of collegiate level, so that he can enter the four-year institutions as a fully qualified junior. Reports from universities across the country indicate that many in this group do transfer, graduate, and continue on to complete graduate degrees. EPCC also enrolls many students eligible to enter a four-year college, directly from high school but who, for various reasons, elect to attend the two year college and then transfer.

If EPCC is to maintain college level standards in college level courses it must be concerned about and maintain the integrity of its transfer courses and program. Therefore, for students not qualified to undertake a college level course or program with a reasonable chance of success, the college must provide remedial courses in the various sciences. These courses include high school equivalent work for students who have not yet developed the competence to master college level course work or who have avoided a given science in high school.

2. A definite contradiction exists between the flexible, innovative building design and a rigid, traditional schedule.

The load distribution of faculty should be reviewed to determine an optimum balance which would enable instructors to develop new instructional materials or to spend a considerable amount of time in open labs or the audio-tutorial laboratory. The College should develop specific policies with respect to the instructional philosophy as it relates to lecture-laboratory classes and the audio-tutorial instruction in the science area. This philosophy should be developed by a committee composed of science faculty, division chairs and appropriate administrators.

In addition to this philosophy, the committee should consider the number of students assigned to lecture-laboratory classes and develop a policy for scheduling faculty to the lecture-laboratory aspects of the course.

3. The feasibility of assigning laboratory technicians to perform duties which currently are assigned instructors and which could be completed by paraprofessionals should be further investigated.

4. There is a need for pre-assessment that is not part of the course. The faculty and administration should identify as many characteristics of students as possible which may have an influence on the students' ability to successfully complete various science programs. A collection of data from

pre-assessment and student success should be studied over a number of years.

5. The College needs to improve its follow-up of former students who may complete one or more years at EPCC, but do not graduate. The experience of many community colleges is that a large percentage of science orientated students transfer without graduating. The College needs to know what courses transfer students are taking at 4 year schools to determine what additional courses should be provided in order to keep students at EPCC for two complete years. In addition, specific reporting of the employment status of former science students should be made with the goal of obtaining feedback for improving the overall science program.

6. Science faculty should consider developing, with the guidance of the Center for Independent Studies personnel, a tutorial program for each discipline in which tutors would be selected by the science faculty. Tutors would be required to enroll in a methods seminar conducted by the discipline faculty. This seminar would be in addition to any tutorial preparation the personnel of the Center of Independent Study thought necessary. The tutors then would concentrate their time in both the audio-tutorial lab and open-labs of the science department.

7. A committee of science faculty, program directors, and division chairs should develop science course objectives so that they are more closely related to program needs. Another possible solution is to give each introductory course a separate catalog number that addresses each program or identifies the program populations by separate and exclusive section numbers in the schedule.

8. Science faculty should consider developing modular materials for the remediation of student weaknesses in the various disciplines. These materials are to be used in the audio-tutorial laboratory and independent study modes.

9. The science faculty should also consider developing special topic courses which would provide expansion of the curricula. Those courses for which there is not sufficient demand to be offered on a frequent basis, could be offered through the audio-tutorial lab.

El Paso Community College was fortunate to have been awarded the TYCLASE funding to assess its science program and arrive at the above recommendations.

APPENDIX AI
QUESTIONNAIRE FOR STUDENT SURVEY

Science Course Assessment

Student Survey

1. What is your major? _____
2. Please indicate your current status;
 - (1) _____ Part-time student (less than 12 hours)
 - (2) _____ Full-time student (12 or more hours)
3. What was your Primary objective in taking Science courses?
 - (1) _____ University transfer credit
 - (2) _____ To satisfy program requirement
 - (3) _____ Improvement of existing job skills
 - (4) _____ Personal interest
 - (5) _____ Other (specify) _____
4. Which statement best describes your feelings about your educational experience in science courses at EPCC.
 - (1) _____ Very satisfied
 - (2) _____ Satisfied
 - (3) _____ Neutral
 - (4) _____ Disappointed
 - (5) _____ Very disappointed
5. How do you see the science courses in terms of your career plans.
 - (1) _____ of immediate, direct benefit
 - (2) _____ of long term
 - (3) _____ of indirect benefit
 - (4) _____ of no benefit

6. Prior to taking any science courses at EPCC, would you say that your previous schooling:

- (1) _____ fully prepared you
 (2) _____ prepared you, for the most part
 (3) _____ not as prepared as you should have been
 (4) _____ Not at all prepared

7. In your opinion, how well did science courses at EPCC prepare you for meeting program requirements?

- (1) _____ Very Good
 (2) _____ Good
 (3) _____ Neutral
 (4) _____ Poor
 (5) _____ Very Poor

8. Please provide your assessment of your preparation at EPCC for each of the science areas listed below which apply to you.

	<u>Strongly Prepared</u>	<u>Average</u>	<u>Weak</u>	<u>Not Prepared</u>	<u>Not Applicable</u>
Chemistry	_____	_____	_____	_____	_____
Physics	_____	_____	_____	_____	_____
Biology	_____	_____	_____	_____	_____
Anatomy and Physiology	_____	_____	_____	_____	_____
Microbiology	_____	_____	_____	_____	_____
Math	_____	_____	_____	_____	_____

9. If in your opinion, you were not adequately prepared in science or math to function successfully in your program, please indicate what you perceive to be some possible reasons (check as many that apply):

- (1) _____ Inappropriate science/math course objectives
 (2) _____ Inadequate coverage objective
 (3) _____ Inadequate developmental courses in the sciences
 (4) _____ Not enough lab time
 (5) _____ Too much lab time
 (6) _____ Inadequate facilities
 (7) _____ Lack of relationship of subject matter to program needs

10. For each of these checked above, please provide specific information.

11. Please provide your assessment of each of the support services listed below in term of their assistance in meeting program needs.

	Excellent	Good	Fair	Poor	Comments
Developmental Studies					
Tutoring Services					
Library Holdings					
A-T Lab					
Other (specify)					

12. What recommendations would you have for making the science offerings more adequate for program needs.

13. Are you interested in taking other science courses at EPCC? You may include courses not presently offered by the college.

(1) _____ No

(2) _____ Yes, What course _____

14. In regard to science courses, do you think that you were advised properly by counselors as to:

- | | | |
|---|-----------|----------|
| a) course prerequisites | YES _____ | NO _____ |
| b) transferability of courses | YES _____ | NO _____ |
| c) program requirements | YES _____ | NO _____ |
| d) study skills needed in science courses | YES _____ | NO _____ |
| e) financial aid | YES _____ | NO _____ |
| f) course requirements | YES _____ | NO _____ |
| g) availability of audio-tutorial laboratory assistance | YES _____ | NO _____ |
| h) availability of tutorial services | YES _____ | NO _____ |

15. If you wish to comment on the counseling services, please do.

This image shows a blank, aged, cream-colored page, likely an endpaper or flyleaf from an old book. The paper has a slightly textured appearance with some minor discoloration and small dark spots, possibly due to age or handling. A faint, irregular smudge or mark is visible near the bottom center of the page. The overall tone is a warm, off-white or light beige.

APPENDIX AII
QUESTIONNAIRE FOR PROGRAM DIRECTORS

PROGRAM

1. Please provide the assessment of student preparation into program in the science area appropriate to your program. In considering your response, please answer in relation to student performance in courses for which those listed below are pre-requisite.

	<u>Strongly Prepared</u>	<u>Average</u>	<u>Weak</u>	<u>Not Prepared</u>	<u>Not Applicable</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

2. Please provide your subjective assessment of student preparation of courses completed at EPCC in general for each of the science areas listed below:

	<u>Strongly Prepared</u>	<u>Average</u>	<u>Weak</u>	<u>Not Prepared</u>	<u>Not Applicable</u>
Chemistry	_____	_____	_____	_____	_____
Physics	_____	_____	_____	_____	_____
Anatomy & Physiology	_____	_____	_____	_____	_____
Microbiology	_____	_____	_____	_____	_____
Math	_____	_____	_____	_____	_____

3. If in your opinion, students are not adequately prepared in science or math to function successfully in your program, please indicate what you perceive to be some possible reasons (check as many that apply):

- _____ Inappropriate science/math course objectives
- _____ Inadequate course objective
- _____ Inadequate developmental course in the sciences
- _____ Not enough lab time
- _____ Too much lab time

_____ Inadequate facilities

_____ Lack of relationship of subject matter to
program needs

4. For each of these checked above, please provide specific information.

5. Please provide your assessment of each of the support services listed below in terms of their assistance in meeting program needs.

	Excellent	Good	Fair	Poor	Comment
Developmental Studies	_____	_____	_____	_____	_____
Tutoring Services	_____	_____	_____	_____	_____
Library Holdings	_____	_____	_____	_____	_____
A-T Lab	_____	_____	_____	_____	_____
Other (Specify)	_____	_____	_____	_____	_____

6. What recommendations would you have for making the science offerings more adequate for program needs.

APPENDIX AIII
QUESTIONNAIRE FOR SCIENCE FACULTY

SCIENCE FACULTY QUESTIONNAIRE

Please complete one questionnaire for each class you are presently teaching.

Course name and number: _____

Your discipline: _____

1. In general, do your students have adequate preparation in the following to successfully complete your course:

	YES	NO	NA
Reading skills	_____	_____	_____
Writing skills	_____	_____	_____
Math skills	_____	_____	_____
Study skills	_____	_____	_____
Reasoning skills	_____	_____	_____
Some Chemistry background	_____	_____	_____
Some Biology background	_____	_____	_____
Some Physics background	_____	_____	_____

2. What should be the balance in terms of emphasis between theory and application for this course.

theory _____ percent

application _____ percent

3. In your opinion do existing facilities facilitate instruction in the course.

Lab
Yes _____
No _____
N/A _____

Classroom
Yes _____
No _____
N/A _____

4. If no, why not?

5. In your opinion, are pre-requisites being enforced?

Yes _____

Don't Know _____

No _____

6. In your opinion, have students mastered the pre-requisite course objectives prior to enrolling in this course.

Yes _____

No _____

N/A _____

No Opinion _____

7. Do pre-requisite courses include objectives you consider necessary for entry into this course.

All _____

Most _____

Some _____

None _____

8. If not all objectives are covered, please list those which you think should be included. (e.g. balancing equations)

_____	_____
_____	_____
_____	_____

9. Please check the appropriate responses corresponding to those instructional modes compatible with your teaching style.

<u>Techniques</u>	<u>Like to use</u>	<u>Unable to use</u>	<u>Would Use if I could</u>	<u>Remarks</u>
Demonstration	_____	_____	_____	_____
Lecture	_____	_____	_____	_____
Group Discussion	_____	_____	_____	_____
Individual Activities	_____	_____	_____	_____
Auto-Tutorial	_____	_____	_____	_____

<u>Techniques</u>	<u>Like to use</u>	<u>Unable to use</u>	<u>Would use if I could</u>	<u>Remarks</u>
Guest Lecturers	_____	_____	_____	_____
Television	_____	_____	_____	_____
Field trips	_____	_____	_____	_____
Open lab with specified days for each discipline with				
.No supervision	_____	_____	_____	_____
.Supervision	_____	_____	_____	_____
.Minimal supervision	_____	_____	_____	_____
Open lab with no specified days per discipline, i.e. disciplines may be mixed with				
.No supervision	_____	_____	_____	_____
.Supervision	_____	_____	_____	_____
.Minimal supervision	_____	_____	_____	_____

10. Please respond to the adequacy of the following services as they support instruction for the course.

	<u>Good</u>	<u>Poor</u>	<u>Don't Know</u>
Library Holdings	_____	_____	_____
Testing Center	_____	_____	_____
Developmental Studies	_____	_____	_____
Tutoring	_____	_____	_____
Counseling	_____	_____	_____
Self Help Modules	_____	_____	_____
Other (Specify)	_____		

For those checked "Poor", please comment into the reason for lack of support.

11. Does your workload allow you to adequately address the needs of your students.

Yes _____

No _____

12. How many contact hours are you carrying this semester.

Lecture _____

Lab _____

APPENDIX A IV

QUESTIONNAIRE FOR PROGRAM DIRECTORS AND SCIENCE FACULTY

MICROBIOLOGY

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Historical Background of Micro				
Description of Microorganisms				
Chemical Basis of Microorganisms				
Bioenergetics				
Microscopy				
Nutrition of Microorganisms				
Environmental Needs of Microorganisms				
Growth of Bacteria				
Cultivation of Bacteria				
Enzymes				
Fungi				
Algae and Protozoa				
Procaryotic cell structure				
Reproduction of Procaryotic organisms				
Identification of Viruses				
Classification of Viruses				
Sterilization and Disinfection				
Antibiotics				
Immunology				
Infection				
Microbiology of Soil				
Microbiology of Foods				
Microbiology of Dairy Products				
Microbiology of Atmosphere				
Industrial Microbiology				

ANATOMY & PHYSIOLOGY

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Organization of the Body				
Cell structure				
Cell function				
Cellular specialization				
Tissues of Nervous System				
Nerve impulse				
Spinal cord				
Spinal nerve				
Brain				
Cranial nerve				
Senses				
Endocrine system				
Biomechanics				
Skeletal system				
Muscular tissue structure				
Muscular tissue function				
Respiration				
The Heart				
Blood circulation				
Lymphatic circulation				
Blood pressure				
Types of body fluids				
Digestive tissue				
Digestive organs				

ANATOMY & PHYSIOLOGY

PROGRAM/DISCIPLINE _____

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Process of digestion				
Utilization of food				
Regulation of body temperature				
Reproductive systems				
Gametogenesis				
Genetics				

P H Y S I C S

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Torque Wrench				
Hook's Law				
Density of materials				
Properties of liquids				
Relationship between force & Pressure				
Pressure measurements				
Buoyant forces exerted on objects by liquids				
Pressure & the rate of flow of a liquid				
Laser light				
Optics				
Properties of Light				
Laser Applications				
Wave length & color				
Electromagnetic Spectrum				
Waves & communications				
Line Spectra of gases				
Photons				
Motions				
Energy				
Momentum				
Atomic structure				
Solids				
Liquids				
Gases & plasmas				
Transmission of heat				

C H E M I S T R Y

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Matter				
Elements & Compounds				
Atomic Theory				
Electronic structure				
Periodic table				
Nomenclature				
Kinetics				
Chemical equations				
Gases & Gas Laws				
Water & Liquids				
Solutions				
Acids, bases, salts				
Chemical equilibrium				
Oxidation-reduction				
Chemical bonding				
Solid state				
Electrochemistry				
Thermochemistry				
Nuclear chemistry				
Formulas				
Mole concept				
Stoichiometry				
Writing balancing equations				
Graphical methods				
Scientific method				
Entropy concept				
Organic chemistry				
Biochemistry		37		

B I O L O G Y

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Historical Background of Biology				
"Scientific Method"				
Chemistry of Life				
chemical structure				
chemical reaction				
compounds				
Characteristics of Life				
Organization of Living Systems				
Cell				
structure				
processes				
specialization				
Tissues				
types				
Organs				
Systems				
anatomical structure				
physiological processes				
disorders & diseases				
in major human systems				
Cellular Reproduction				
Genetics				
Reproduction & Growth				
Plants				
Animals				
Nutrition				
Autotrophic				
Heterotrophic				
Digestion				
Transport				
Intracellular				
Multicellular plants				
Animals				
Mammalian circ. systems				
Gas Exchange				
Vascular plants				
Invertebrates				
Vertebrates				

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Respiration				
O ₂ /CO ₂ Transport				
Metabolic Rates				
Homeostasis				
Movement				
Cellular				
Plants				
Animals				
Muscles/ A & P				
Nervous System				
Sensory organs				
Nerve function				
Evolution				
Pop. Genetics				
Speciation				
Adaptation				
Diversification				
Species				
Ethology				
Ecology				
Systems				
Energy Flow				
Species interactions				
Populations				
Biogeography				
Biomes				
Man & Relationship to				
Environment				
Taxonomy				
Monera				
Protista				
Plantar				
Animalia				

MICROBIOLOGY

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	HEAVY	MODERATE	LIGHT	NO COVERAGE
Historical Background of Micro				
Description of Microorganisms				
Chemical Basis of Microorganisms				
Bioenergetics				
Microscopy				
Nutrition of Microorganisms				
Environmental Needs of Microorganisms				
Growth of Bacteria				
Cultivation of Bacteria				
Enzymes				
Fungi				
Algae and Protozoa				
Prokaryotic cell structure				
Reproduction of Prokaryotic organisms				
Identification of Viruses				
Classification of Viruses				
Sterilization and Disinfection				
Antibiotics				
Immunology				
Infection				
Microbiology of Soil				
Microbiology of Foods				
Microbiology of Dairy Products				
Microbiology of Atmosphere				
Industrial Microbiology				

APPENDIX B
FINDINGS OF STUDENT SURVEY

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

1. Students' Major:

MAJOR	N	%
VOC. TECH.	54	13.0
ALLIED HEALTH	65	15.6
LIBERAL ARTS	296	71.3
TOTAL	415	99.9

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

2. Students' current status:

<u>MAJOR</u>	<u>PART - TIME</u>		<u>FULL - TIME</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
VOC. TECH.	24	44.4	30	55.6	54	100
ALLIED HEALTH	9	14.1	55	85.9	64	100
LIBERAL ARTS	71	24.1	224	75.9	295	100
TOTAL	104	25.2	309	74.8	413	100%

NOTE: Full-time - students who are carrying 12 or greater than 12 semester credit hours.

Part-time - students who are carrying less than 12 semester credit hours.

NSY: STUDENT SURVEY - FREQUENCY DISTRIBUTION

3. Primary objective in taking science courses:

<u>OBJECTIVE</u>	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
UNIVERSITY TRANSFER	6	7.8	4	5.4	141	40.9	151	30.4
PROGRAM REQUIREMENT	16	20.8	43	58.1	124	35.9	183	36.9
IMPROVE JOB SKILLS	29	37.7	6	8.1	12	3.5	47	9.5
PERSONAL INTEREST	22	28.6	12	16.2	50	14.5	84	16.9
OTHER	4	5.2	9	12.2	18	5.2	31	6.3

TOTAL 77 100.1 74 100 345 100 496 100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

4. Feelings about science courses at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
VERY SATISFIED	17	31.5	13	23.2	52	17.9	82	20.5
SATISFIED	29	53.7	26	46.4	97	33.4	152	38.0
NEUTRAL	5	9.3	12	21.4	80	27.6	97	24.2
DISAPPOINTED	2	3.7	3	5.4	34	11.7	39	9.8
VERY DISAPPOINTED	1	1.9	2	3.6	27	9.3	30	7.5
TOTAL	54	100	56	100	290	100	400	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

5. Science courses in terms of career plans:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
IMMEDIATE BENEFIT	31	58.5	42	64.6	71	24.3	144	35.12
LONG TERM BENEFIT	11	20.8	14	21.5	82	28.1	107	26.10
INDIRECT BENEFIT	11	20.8	8	12.3	107	36.6	126	30.73
NO BENEFIT	--	----	1	1.5	32	11.0	33	8.05
TOTAL	53	100	65	100	292	100	410	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

6. Science preparation prior to EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
FULLY PREPARED	5	9.4	14	21.9	25	8.7	44	10.89
PREPARED	28	52.8	20	31.3	152	53.0	200	49.5
SOMEWHAT PREPARED	18	34.0	23	35.9	86	30.0	127	31.44
NOT PREPARED	2	3.8	7	10.9	24	8.4	33	8.17
TOTAL	53	100	64	100	287	100	404	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

7. How well did science courses at EPCC prepare you for program requirements?

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
VERY GOOD	17	32.1	11	20.8	49	17.6	77	20.0
GOOD	30	56.6	30	56.6	94	33.7	154	40.0
NEUTRAL	5	9.4	9	17.0	81	29.0	95	24.68
POOR	1	1.9	2	3.8	27	9.7	30	7.79
VERY POOR	--	---	1	1.9	28	10.0	29	7.53
TOTAL	53	100	53	100	279	100	385	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTED

8a. Assessment of preparation of chemistry at EPCC for program requirements:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
STRONGLY PREPARED	1	1.8	5	7.7	30	10.1	36	8.7
AVERAGE	4	7.5	13	20.0	41	13.9	58	14.0
WEAK	3	5.5	8	12.3	30	10.1	41	9.9
NOT PREPARED	6	11.1	7	10.8	15	5.1	28	6.7
* NOT APPLICABLE	40	74.1	32	49.2	180	60.8	252	60.7
TOTAL	54	100	65	100	296	100	415	100

*Chemistry was not a requirement for the students' course of study.

NSF: STUDENT SURVEY -- FREQUENCY DISTRIBUTION

8b. Assessment of physics preparation for program requirements at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>Z</u>	<u>N</u>	<u>Z</u>	<u>N</u>	<u>Z</u>	<u>N</u>	<u>Z</u>
STRONGLY	2	3.7	-	-	4	1.3	6	1.4
AVERAGE	17	31.5	13	20.0	29	9.8	59	14.2
WEAK	3	5.5	1	1.5	25	8.4	29	7.0
NOT PREPARED	2	3.7	3	4.6	28	9.5	33	8.0
NOT APPLICABLE	30	55.6	48	73.9	210	71.0	288	69.4
TOTAL	54	100	65	100	296	100	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

8c. Assessment of biology preparation for program requirements at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
STRONGLY	1	1.8	10	15.4	26	8.8	37	8.9
AVERAGE	9	16.7	17	26.1	107	36.1	133	32.0
WEAK	2	3.7	2	3.1	69	23.3	73	17.6
NOT PREPARED	3	5.6	3	4.6	14	4.7	20	4.8
NOT APPLICABLE	39	72.2	33	50.8	80	27.0	152	36.6
TOTAL	54	100	65	100	296	100	415	99.9

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

'8d. Assessment of anatomy and physiology preparation for program requirements at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
STRONGLY PREPARED	1	1.8	19	29.2	13	4.4	33	8.0
AVERAGE	6	11.1	22	33.9	27	9.1	55	13.3
WEAK	4	7.5	3	4.6	11	3.7	18	4.3
NOT PREPARED	2	3.7	5	7.7	23	7.8	30	7.2
NOT APPLICABLE	41	75.9	10	24.6	222	75.0	279	67.2
TOTAL	54	100	65	100	296	100	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

8e. Assessment of microbiology preparation for program requirements at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
STRONGLY PREPARED	-	-	2	3.1	5	1.7	7	1.7
AVERAGE	2	3.7	16	24.6	9	3.0	27	6.5
WEAK	5	9.3	4	6.1	11	3.7	20	4.8
NOT PREPARED	2	3.7	4	6.2	14	4.7	20	4.8
NOT APPLICABLE	45	83.3	39	60.0	257	86.8	341	82.2
TOTAL	54	100	65	100	296	99.9	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

8f. Assessment of math preparation for program requirements at EPCC.

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
STRONGLY PREPARED	18	33.3	8	12.3	34	11.5	60	14.4
AVERAGE	26	48.1	18	27.7	104	35.1	148	35.7
WEAK	6	11.1	3	4.6	42	14.2	51	12.3
NOT PREPARED	--	--	2	3.1	12	4.1	14	3.4
NOT APPLICABLE	4	7.5	34	52.3	104	35.1	142	34.2
TOTAL	54	99.9	65	100	296	100	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

9. Possible reasons why science courses failed to prepare students' for programs:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
INAPPROPRIATE OBJECTIVES	4	8.3	2	3.0	94	18.9	100	14.2
INADEQUATE OBJECTIVES	7	14.6	21	31.8	108	21.7	230	32.6
INADEQUATE DEVELOPMENTAL STUDIES	9	18.7	10	15.2	88	17.7	107	15.2
NOT ENOUGH LAB	13	27.1	2	3.0	29	5.8	44	6.2
TOO MUCH LAB	--	---	7	10.6	64	12.8	71	10.0
INADEQUATE FACILITIES	6	12.6	4	6.1	69	13.9	79	11.2
LACK OF RELATIONSHIP	9	18.7	20	30.0	46	9.2	75	10.6
TOTAL	48	100	66	100	498	100	706	100

10. For each of these checked above please provide specific information.

1) Inappropriate science/math course objectives:

Although I checked this, the major problem is that there needs to be more math on the university level. I would highly recommend the math instructors at EPCC. There needs to be more courses offered for this particular degree plan.

2) Inadequate coverage objective:

I'm referring to my failure, not the teacher's. I would read the subject matter attend class regularly, and still someone would say it wasn't done right. When I attempted to understand the subject according to new instructions, this is when I got tied up. In the end, I just put it off till it became impossible to catch up again.

3) Inadequate developmental courses in the sciences:

There should possibly be a math or science course prerequisite to the courses in question.

4) Not enough lab time:

Need more lab time to apply the subjects (Math & Science) learned to the lecture.

5) Too much lab time:

No response.

6) Inadequate facilities:

One biology lab was of inconvenience this fall semester. Having two classes going on at the same time caused distraction. Lack of lab equipment in the physics department caused problems in some classes.

7) Lack of relationship of subject matter to program needs:

Objectives of the subject matter have no direct bearing in the course of air conditioning/refrigeration and its objectives. As for the objectives, we didn't have enough time to cover all of them and there was not enough explanation or review before the tests. There is so much note taking that we don't get to discuss principle objectives.

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

11a. Assessment of developmental studies in meeting program needs:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
EXCELLENT	7	13.0	10	15.4	36	12.2	60	14.5
GOOD	21	38.9	28	43.1	64	21.6	113	27.2
FAIR	5	9.3	6	9.2	28	9.5	39	9.4
POOR	1	1.8	5	7.7	83	28.0	89	21.4
NOT ASCERTAINED	20	37.0	16	24.6	85	28.7	114	27.5
TOTAL	54	100	65	100	296	100	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

11b. Assessment of tutoring services for meeting program needs:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
EXCELLENT	4	7.5	7	10.8	20	6.8	31	7.5
GOOD	16	29.6	21	32.3	55	18.6	92	22.1
FAIR	8	14.8	8	12.3	57	19.2	73	17.6
POOR	2	3.7	9	13.8	84	28.4	95	22.9
NOT ASCERTAINED	24	44.4	20	30.8	80	27.0	124	29.9
TOTAL	54	100	65	100	296	100	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

11c. Assessment of library holdings for meeting program needs:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
EXCELLENT	9	16.7	8	12.3	22	7.4	39	9.4
GOOD	16	29.6	22	33.9	72	24.3	110	26.5
FAIR	5	9.3	16	24.6	48	16.2	69	16.6
POOR	5	9.2	5	7.7	85	28.7	95	22.9
N/A	19	35.2	14	21.5	69	23.3	102	24.6
TOTAL	54	100	65	100	296	99.9	415	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

11d. Assessment of audio-tutorial laboratory for meeting program needs:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
EXCELLENT	3	5.6	6	9.2	22	7.4	31	7.5
GOOD	15	27.8	15	23.1	79	26.7	109	26.3
FAIR	3	5.5	8	12.3	37	12.5	48	11.5
POOR	2	3.7	4	6.2	46	15.5	52	12.5
N/A	31	57.4	32	49.2	112	37.8	175	42.2
TOTAL	54	100	65	100	296	99.9	415	100

NSF STUDENT SURVEY

12. What recommendations would you have for making the science offerings more adequate for program needs.

There needs to be some basic courses offered before students are allowed to enter some science courses, such as Chemistry.

Keep enrollment low by having more classes of the same course.

Have all extra-help programs available on weekends for people who work during weekdays.

Good chemistry tutors and more illustrative films are needed in chemistry.

For tutoring services, more qualified personnel should be hired & more tutors because one has to make appointments for services.

More facilities, good books, & more information are needed.

Instructor should not cover so much material in 2 weeks.
Take time covering each objective.

Breakdown each course to study & evaluate its objectives & provide courses which are directly beneficial to that course.

Make a chemistry class especially geared to each program.

Stick more to what really is actually needed for specific programs and cover it more fully.

Have course correspond more closely to the offerings at University of Texas at El Paso which is very important for transfer students to include text books.

I would like to see our program negotiate with the science department for the benefit of the students.

The basics should be stricter to "weed out" students not suited to this science.

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13. Interest in taking other science courses at EPCC:

	<u>VOC. TECH.</u>		<u>ALLIED HEALTH</u>		<u>LIBERAL ARTS</u>		<u>TOTAL</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
NO	26	51.0	32	55.2	170	67.2	228	62.98
YES	25	49.0	26	44.8	83	32.8	134	37.02
TOTAL	51	100	58	100	253	100	362	100

NSF: STUDENT SURVEY - FREQUENCY DISTRIBUTION

14. Proper advising in regard to science courses:

	<u>NO</u>		<u>YES</u>		<u>NOT ASCERTAINED</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
COURSE REQUIREMENTS	137	46.3	122	41.2	37	12.5
TRANSFERABILITY	151	51.0	103	34.8	42	14.2
PROGRAM REQUIREMENTS	134	45.3	120	40.5	42	14.2
SKILLS NEEDED IN SCIENCES	169	57.1	80	27.0	47	15.9
FINANCIAL AID	127	42.9	119	40.2	50	16.9
AUDIO-TUTORIAL ASSISTANCE	153	51.7	93	31.4	50	16.9
TUTORIAL SERVICES	152	51.3	95	32.1	49	16.6
TOTAL	1023	49.4	732	35.3	317	15.3

NSF STUDENT SURVEY

15. If you wish to comment on the counseling services, please do.

It leaves a little to be desired.

Most counselors are willing to advise on a given program at EPCC, but only if asked. However they do seem to try to influence you into going into one of the programs here and are not willing to give much information on a transfer BA or BS at UTEP or other four year institutions. Also when they tell you to enroll in this or that course they do not base the decision on knowledge of whether or not you do know too much or too little to be in that class; consequently many students loose time and money that could be used wisely and advantageously if properly counseled according to what they already know.

We need more full-time counselors.

The counselors I have contacted, seemed overworked. I found that I am my own best counselor.

Human Dev. 1101 should not be required for returning students. An alternative 3 hour course should be offered.

I would like to see our program negotiate with the Science Department for the benefit of the students.

Need for more counseling services by such a small class.

APPENDIX C

FINDINGS OF PROGRAM DIRECTORS SURVEY
FOR SCIENCE COURSE ASSESSMENT

SCIENCE COURSE ASSESSMENT

Program Survey Directors

1. Please provide the assessment of student preparation in the science area appropriate to your program. In considering your response, please answer in relation to student performance in courses for which those listed below are prerequisite.

	<u>Strongly Prepared</u>		<u>Average</u>		<u>Weak</u>		<u>Not Prepared</u>		<u>Total</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
CHEMISTRY									
Voc. Tech.	--	--	1	100	--	--	--	--	1
Allied Health	--	--	--	--	3	60	2	40	5
BIOLOGY									
Voc. Tech.	--	--	--	--	--	--	--	--	0
Allied Health	--	--	3	37.5	4	50	1	12.5	8
PHYSICS									
Voc. Tech.	--	--	--	--	4	100	--	--	4
Allied Health	--	--	--	--	1	33.3	2	66.6	3
ANATOMY & PHYSIOLOGY									
Voc. Tech.	--	--	--	--	3	100	--	--	3
Allied Health	--	--	--	--	4	40	6	60	10
MATH									
Voc. Tech.	--	--	--	--	5	100	--	--	5
Allied Health	--	--	3	37.5	5	62.5	--	--	8

SCIENCE COURSE ASSESSMENT

2. (Student Survey, Q. 8) Please provide your subjective assessment of student preparation at EPCC in general for each of the science areas listed below:

	<u>Strongly Prepared</u>		<u>Average</u>		<u>Weak</u>		<u>Not Prepared</u>		<u>Total</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
CHEMISTRY									
Voc. Tech.	--	--	--	--	2	100	--	--	2
Allied Health	--	--	4	66.6	--	--	2	33.3	6
PHYSICS									
Voc. Tech.	--	--	1	25	3	75	--	--	4
Allied Health	--	--	--	--	2	66.6	1	33.3	3
BIOLOGY									
Voc. Tech.	--	--	--	--	--	--	--	--	0
Allied Health	1	25	3	75	--	--	--	--	4
ANATOMY & PHYSIOLOGY									
Voc. Tech.	--	--	--	--	--	--	--	--	0
Allied Health	2	28.6	4	57.1	--	--	1	14.3	7
MICROBIOLOGY									
Voc. Tech.	--	--	--	--	--	--	--	--	0
Allied Health	--	--	3	75	--	--	1	25	4
MATH									
Voc. Tech.	--	--	2	40	3	60	--	--	5
Allied Health	--	--	2	33.3	2	33.3	2	33.3	6

SCIENCE COURSE ASSESSMENT

3. If in your opinion, students are not adequately prepared in science, or math to function successfully in your program, please indicate what you perceive to be the possible reasons (check as many as apply):

	<u>Voc/Tech</u>		<u>Allied Health</u>		<u>Total</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Inappropriate Science, math course objectives	3	30.0	4	18.8	7	21.7
Inadequate coverage of objectives	1	10.0	3	13.3	4	12.0
Inadequate developmental courses in sciences	2	20.0	4	18.8	6	18.5
Not enough lab time	2	20.0	1	4.4	3	9.7
Too much lab time	1	10.0	1	4.4	2	6.5
Inadequate facilities	--	--	1	4.4	1	3.2
Lack of relationship of subject matter to program needs.	1	10.0	8	36.6	9	28.2
Total	10	100.0	22	100.0	32	99.8

SCIENCE COURSE ASSESSMENT

4. For each of these checked above please provide specific information

Science

Biology 3101 - could be strengthened to provide a stronger base for succeeding courses on Biology 4107/4108. These are comprehensive & provide an adequate background for path physiology.

Students could use some lab experience to help them understand principles of evaporation, magnetism, etc.

Math

Students show difficulty in solving simple arithmetic problems (Electronics Program Director)

Math skills are consistently below desired levels. Even the brightest students show obvious weaknesses in math (Medical Lab Technician).

Students seem to have consistent problems in any content requiring math skills (Radiologic Technology).

Present math level assessed as sufficient for admission is reported insufficient for pharmacological calculations. Students can't always apply math concepts when faced with stress of pharm. exam or on the job calculating. (Nursing Director)

Students need practical experience in measurements & use of this type of instruments. (Auto Mechanics Director)

Objectives of Math 3107 and 3108 for Construction/Survey Technology major should include the recommended contents (see) in order to successfully complete the program.

SCIENCE COURSE ASSESSMENT

5. Please provide your assessment of each of the support services listed below in terms of their assistance in meeting program needs:

	Excellent		Good		Fair		Poor		Total
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>
Developmental Studies									
Voc. Tech.	-	-	3	75	1	25	-	-	4
Allied Health	1	16.7	3	50	-	-	2	33.3	6
Tutoring Services									
Voc. Tech.	-	---	1	33.3	2	66.7	-	---	3
Allied Health	-	---	5	50	2	20	3	30	10
Library Holdings									
Voc. Tech.	1	20	3	60	-	-	1	20	5
Allied Health	1	12.5	3	37.5	4	50	-	-	8
A-T Lab									
Voc. Tech.	-	---	-	-	-	-	-	-	0
Allied Health	-	---	-	-	-	-	1	100	1
Other (Specify)									
Voc. Tech.	-	---	-	-	-	-	1	100	1
Allied Health	-	---	-	-	-	-	-	-	0

6. What recommendations would you have for making the science offerings more adequate for program needs.

MLT - Requires a strong background in physiology. Orientation of science courses toward this area is recommended. (Medical Lab Technician)

Rad - Developmental of a "Science Math", or some way of integrating modules on scientific notation, powers of ten, exponents scales in existing algebra course. (Radiologic Technician)

Nursing - Maintain high standards. Instigate remedical course as required pre-requisites for those students not achieving minimum competency levels required for science/math (Nursing Director)

Auto Mech - Offer programs that relate directly to students major (Auto Mechanics Director)

The following should be included in Math 3107 for students who major in construction/survey technology:

1. Simplification - Reducing fractions.
2. Combining numbers into single fractions or mixed numbers.
3. Multiplication of fractions.
4. Conversion of numbers to decimals
5. Conversion of Decimal numbers to fraction.
6. Addition of Dimensions.
7. Calculation of Board feed and finding costs.
8. Finding volumes, areas of rectangles prisms, cylinders, square based pyramids, cones and irregular areas.

The following should be included in Math 3108 for students who major in construction/survey technology:

Calculation of rectangular coordinates for traverse station and related points.

Adjustment of angles, (deflection angles) traverse by azimuths, interior and exterior angles.

Horizontal and vertical curves

- a. spiral angles
- b. deflection angles
- c. degree of curve
- d. pattern of triangles
- e. coordinate methods

Trigonometric formulas. Use of

- a. right triangles
- b. oblique triangles

APPENDIX DI
FINDINGS OF BIOLOGY FACULTY SURVEY

68.

72

FINDINGS OF BIOLOGY FACULTY SURVEY

1. In general, do your students have adequate preparation in the following to successfully complete the course?

	YES			NO			NOT APPLICABLE		
	N = 6	N = 5	N = 6	N = 6	N=5	N=6	N = 6	N=5	N=6
	For Biology Major (4101-02)	For Allied Health Major (4107-08)	For Liberal Arts Major (4111-12)	For Biology (4101-02)	For A H (4107-08)	For L A (4111-12)	For Biology (4101-02)	For A H (4107-08)	For L A (4111-12)
Reading Skills	50.0%	80%	16.7%	50. %	20%	83.3%	-	-	-
Writing Skills	33.3%	80%	16.7%	66.6%	20%	83.3%	-	-	-
Math Skills	16.6%	60%	16.7%	83.4%	20%	83.3%	20%	-	-
Study Skills	33.3%	60%	33.4%	66.6%	40%	66.6%	-	-	-
Reasoning Skills	16.6%	40%	33.4%	38.4%	60%	66.6%	-	-	-
Some Chemistry Backgrounds	---	60%	16.7%	100	20%	83.3%	20%	-	-
Some Biology Backgrounds	---	60%	16.7%	100	40%	83.3%	-	-	-
Some Physics Backgrounds	---	20%	16.7%	100	60%	83.3%	20%	-	-

2. What should be the balance in terms of emphasis between theory and application for this course.

Average Percentage of Emphasis Between Theory & Application by Area			
	BIOLOGY (4101-02)	ALLIED HEALTH (4107-08)	LIBERAL ARTS (4111-12)
THEORY	60%	75%	57%
APPLICATION	40	25	43
TOTAL	100	100	100

3. In your opinion do existing facilities facilitate instruction in the course.

RESPONSE	LAB			CLASSROOM		
	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)
YES	16.7%	40%	33.3%	100%	100%	66.7%
NO	83.3	40	66.7	-	-	33.3
NOT APPLICABLE	-	20	-	-	-	
TOTAL	100%	100%	100.0	100%	100%	100.0

4. If no, why not?

LABORATORY

It's a mess. The lab is too noisy, there is inadequate ventilation, there is too much mixing of students from one course to the other and in storerooms.

When 2 or 3 labs are scheduled concurrently it is almost impossible to concentrate and talk not to mention increased safety hazards; lab needs partitions.

No barrier between sections; no screen or dark areas for A-V presentations; no ventilation to void toxic fumes; important lab materials not purchased!

The lab is built to accomodate 20-25 students, the average lab enrollment has been 25-30 students in some cases (lab space is too small if there are over 25 students at the same time).

We are in dire need of a room adjacent to the biology lab where we can give a short lab.

We do not have enough microscopes or models & other expensive equipment to meet the needs and expectations of the students.

Our laboratory facilities would be adequate if the number of students were limited to 20-24 at the Rio Grande Campus.

CLASSROOM

There are no screens for slides & no chalk.

It is too noisy except for classrooms on the first floor near automotive.

More than 20-24 students cannot see the blackboard & projection screen. Chairs are moved from one lab to another or students sit on the tables when both labs are in use.

5. In your opinion, are pre-requisites being offered?

	Pre-requisite Being Enforced		
	Biology (4101-02) N=6	Allied Health (4107+08) N=5	Liberal Arts (4111-12) N=6
Yes	16.7	40%	33.3
No	83.3	20%	66.6
Don't Know	-	20%	-
Not applicable	-	20%	-
TOTAL	100	100	99.9

6. In your opinion, have students mastered the pre-requisite course objectives prior to enrolling in this course.

PRE-REQUISITE MASTERY			
	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)
YES	100%	40%	50%
NO	-	-	50%
DON'T KNOW	-	-	
NOT APPLICABLE	-	60	
TOTAL	100	100	100

7. Do pre-requisite courses include objectives you consider necessary for entry into this course?

NECESSARY PRE-REQUISITE INCLUDED			
	BIOLOGY (4101002)	A H (4107- 08)	L A (4111- 12)
ALL	100.0	60	100
MOST	-	40	-
SOME	-	-	-
TOTAL	100.0	100	100

8. If not all objectives are covered, please list those which you think should be included. (e.g. balancing equations)

The most noticeable wheaknesses are in language & math. A student has no chance of successfully completing a biology course if he/she cannot write a sentence or understand English.

9. Please check the appropriate responses corresponding to those instructional modes compatible with your teaching style.

TECHNIQUES	LIKE TO USE			UNABLE TO USE			WOULD USE IF I COULD		
	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)
Demonstration	100	60%	50	-	-	-	-	-	-
Lecture	100	100%	50	-	20%	-	-	20%	-
Group Discussions	67	100%	50	-	-	-	33.	-	-
Individual Activities	16.7	60%	33.3	16.6	-	-	66.7	-	-
Auto Tutorial	16.7	80%	33.3	50.5	40	-	33.3	-	16.6
Guest Lecture	67.	20%	16.7	16.6	20	16.7	33.3	-	16.6
Television	16.7	40%	16.7	-	20	16.7	66.7	-	16.6
Field trips	16.7	20%	33.3	-	20	16.7	83.7	-	-
Open lab with specified days for each discipline	100	20%	33.3	-	40	33.3	-	-	-
Open lab with no specified days per discipline.	100	20%	-	-	80	-	-	-	-
TOTAL	50.5	52%	26.7%	8.3%	48%	8.3%	33.4	20%	50

10. Please respond to the adequacy of the following services as they support instruction for course.

	GOOD			FAIR			POOR		
	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)	BIOLOGY (4101-10)	A H (4107-08)	L A (4111-08)
Library Holdings	33.3%	100%	16.7%	33.3%	-	-	33.3%	-	83.3%
Testing Center	33.3	100%	16.7	-	-	-	66.7	-	83.3
Developmental Studies	33.3	40%	16.7	-	-	-	66.7	60	83.3
Tutoring	16.7	40%	16.7	16.7	-	-	66.7	60	83.3
Counseling	16.7	-	16.7	16.7	20	-	66.7	80	83.3
Self Helping Modules	-	-	16.7	16.7	60	-	83.3	40	-
Other									

11. Does your workload allow you to adequately address the needs of your students?

	BIOLOGY (4101-02)	ALLIED HEALTH (4107-08)	LIBERAL ARTS (4111-12)
YES	66.7%	40%	33.3%
NO	33.3	69	66.7

TOTAL

100

100

100

12. Average contact hours carrying by area.

	BIOLOGY (4101-02)	A H (4107-08)	L A (4111-12)
LECTURE	9	10.2	9
LAB	9	8.4	9

TOTAL 18 18.6 18

APPENDIX DII
FINDINGS OF CHEMISTRY FACULTY SURVEY

FINDINGS OF CHEMISTRY FACULTY SURVEY

1. In general, do your students have adequate preparation in the following to successfully complete your course:

	YES			NO		
	N = 6	N = 5	N = 6	N = 6	N = 5	N = 6
	For Chemistry (4105-06)	For Allied Health (4111-12)	For Liberal Arts (4111-12)	For Chemistry (4105-06)	For Allied Health (4111-12)	For Liberal Arts (4111-12)
Reading Skills	66.7%	80%	16.7%	33.3%	20%	83.3%
Writing Skills	66.7%	80	16.7	33.3	20	83.3
Math Skills	-	60	16.7	100	20	83.3
Study Skills	-	60	16.7	100	40	66.6
Reasoning Skills	-	40	33.4	100	60	66.6
Some Chemistry background	33.3%	60	33.4	66.7	20	83.3
Some Biology background	-	60	16.7	100	40	83.3
Some Physics background	-	20	16.7	100	60	83.3

2. What should be the balance in terms of emphasis between theory and application for this course.

	CHEMISTRY (4105-06)	ALLIED HEALTH (4111-12)	LIBERAL ARTS (4111-12)
% THEORY	66.7%	75%	57%
% APPLICATION	33.3	25	43
TOTAL	100.0	100.0	100.0

3. In your opinion do existing facilities facilitate instruction in the course.

LABORATORY				CLASSROOM		
	CHEM. (4105-06)	A H (4111-12)	L A (4111-12)	CHEM. (4105-06)	A H (4111-12)	L A (4111-12)
YES	33.3%	40%	33.3%	33.3%	100%	66.7%
NO	66.7	60%	66.7	66.7	-	33.3
TOTAL	100.0	100	100	100	100	100

4. If no, why not?

LABORATORY

The laboratory is limited as to the number of heads it contains; in addition, individual equipment desks for students is an immediate need.

Lab has insufficient safety equipment. There are no demonstration lecture classrooms. Audio-Visual equipment is inconvenient & insufficient.

CLASSROOM

No response.

5. In your opinion, are pre-requisites being enforced?

	CHEMISTRY (4105-06)	ALLIED HEALTH (4111-12)	LIBERAL ARTS (4111-12)
YES	-	40%	33.3%
NO	100	20	66.7
TOTAL	100	100	100.0

6. In your opinion, have students mastered the pre-requisite course objectives prior to enrolling in this course.

	PRE-REQUISITE MASTERY		
	CHEMISTRY (4105-06)	ALLIED HEALTH (4111-12)	LIBERAL ARTS (4111-12)
YES	-	40%	50%
NO	100	60	50

TOTAL

100

100

100

7. Do pre-requisite courses include objectives you consider necessary for entry into this course

No responses.

8. If not all objectives are covered, please list those which you think should be included (e.g. balancing equations)

A stronger math requirement is needed. A preassessment for student examination is necessary for this course.

9. Please check the appropriate responses corresponding to those instructional modes committee with your teaching style.

TECHNIQUES	LIKE TO USE			UNABLE TO USE			WOULD USE IF I COULD		
	CHEMISTRY (4105-06)	A H (4111-12)	L A (4111-12)	CHEMISTRY (4105-06)	A H (4111-12)	L A (4111-12)	CHEMISTRY (4105-06)	A H (4111-12)	L A (4111-12)
Demonstration	100%	60	50	-	-	-	-	-	-
Lecture	100%	100	50	-	20	-	-	20	-
Group Discussion	100%	100	50	-	-	-	-	-	-
Individual Activities	33.3%	60	33.3	-	-	-	-	-	-
Auto Tutorial	66.7%	80	33.3	-	40	16.7	33.3	-	16.6
Guest Lectures	33.3%	20	16.7	33.3	-	16.7	33.3	-	16.6
Television	33.3%	40	16.7	-	-	16.7	-	-	16.6
Field Trips	83.3%	20	33.3	-	20	33.3	-	-	-
Open Lab with specified days for each discipline	-	20	33.3	-	40	-	-	-	-
No supervision	-	-	-	-	-	-	-	-	-
Supervision	66.7%	20	33.3	-	80	-	-	-	-
Minimal Supervision	-	-	-	-	-	-	33.3	-	-
Open lab with no specified days per discipline	-	-	-	-	-	-	-	-	-
TOTAL	62	52	32	3	24	8	10%	2%	5

10. Please respond to the adequacy of the following services as they support instruction for the course.

	GOOD			FAIR			POOR		
	CHEM (4105-06)	A H (4111-12)	L A (4111-12)	CHEM (4106-05)	A H (4111-12)	L A (4111-12)	CHEM (4105-06)	A H (4111-12)	L A (4111-12)
Library Holdings	-	100	16.7	-	-	-	100	-	83.3
Testing Center	-	100	16.7	33.3	-	-	66.7	-	83.3
Developmental Studies	-	40	16.7	66.7	-	-	33.3	60	83.3
Tutoring	-	40	16.7	66.7	-	-	33.3	60	83.3
Counseling	-	-	16.7	-	20	-	100	80	83.3
Self Help Modules	-	-	16.7	-	60	-	100	40	-
Other	-	-	-	-	-	-	-	-	-

11. Does your workload allow you to adequately address the needs of your students.

	CHEM. (4105-06)	A H (4111- 12)	L A (4111- 12)
YES	-	40%	33.3%
NO	100	60	66.7

TOTAL 100 100 100

12.. How many contact hours are you carrying this semester?

	CHEM. (4106-05)	A H (4111- 12)	L A (4111- 12)
LECTURE	12	10.2	9
LAB	9	8.4	9

TOTAL 21 18.6 18

APPENDIX E

FINDINGS OF COMPARISON BETWEEN PROGRAM
DIRECTORS AND SCIENCE FACULTY

NOTE: 3.0 = Heavy Emphasis, 2.0 = Moderate Emphasis, 1.0 = Light Emphasis,
0.0 = No Emphasis.

B I O L O G Y 4101-02

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VolTech Directors</u>
Historical Background of Biology	1.0	1.7	N/A
"Scientific Method"	1.0	2.3	N/A
Chemistry of Life	2.0	3.0	N/A
chemical structure	2.0	3.0	N/A
chemical reaction	2.0	2.7	N/A
compounds	2.0	2.7	N/A
Characteristics of Life	2.0	3.0	N/A
Organization of Living Systems	2.0	3.0	N/A
Cell			
structure	1.0	3.0	N/A
processes	2.0	3.0	N/A
specialization	2.0	2.7	N/A
Tissues			
types	1.7	1.7	N/A
Organs	2.0	1.7	N/A
Systems	3.0	2.3	N/A
Anatomical structure	3.0	2.3	N/A
physiological processes	2.0	2.3	N/A
disorders & diseases in major			
human systems	3.0	2.0	N/A
Cellular Reproduction	3.0	3.0	N/A
Genetics	1.0	2.7	N/A
Reproduction and Growth	2.0	0.7	N/A
Plants	1.0	2.7	N/A
Animals	2.0	2.7	N/A
Nutrition			
Autotrophic	N/A	2.0	N/A
Heterotrophic	N/A	2.0	N/A
Digestion	N/A	2.3	N/A
Transport	N/A	2.0	N/A
Intracellular	N/A	2.3	N/A
Multicellular plants	N/A	2.0	N/A
Animals	N/A	2.0	N/A
Mammalian circ. systems	N/A	2.0	N/A
Gas Exchange	N/A	2.0	N/A
Vascular plants	N/A	2.0	N/A
Invertebrates	N/A	2.0	N/A
Vertebrates	N/A	2.0	N/A

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Respiration			
O ₂ /CO ₂ Transport	N/A	2.0	N/A
Metabolic Rates	N/A	2.0	N/A
Homeostasis	N/A	2.0	N/A
Movement			
Cellular	N/A	2.0	N/A
Plants	N/A	2.0	N/A
Animals	N/A	2.0	N/A
Muscles/A&P	N/A	1.7	N/A
Nervous System			
Sensory organs	N/A	2.0	N/A
Nerve function	N/A	2.0	N/A
Evolution			
Pop. Genetics	N/A	2.0	N/A
Speciation	N/A	2.0	N/A
Adaptation	N/A	2.0	N/A
Diversification	N/A	2.0	N/A
Species	N/A	2.0	N/A
Ethology	N/A	1.3	N/A
Ecology	N/A	1.7	N/A
Systems	N/A	1.7	N/A
Energy flow	N/A	1.7	N/A
Species interactions	N/A	1.3	N/A
Populations	N/A	1.3	N/A
Biogeography	N/A	2.0	N/A
Biomes	N/A	2.0	N/A
Man & Relationship to Environment	N/A	N/A	N/A
Taxonomy	N/A	1.7	N/A
Monera	N/A	1.7	N/A
Protista	N/A	1.7	N/A
Planter	N/A	1.7	N/A
Animalia	N/A	1.7	N/A

MICROBIOLOGY

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Historical Background of Micro	2.0	1.0	N/A
Description of Microorganisms	3.0	3.0	N/A
Chemical Basis of Microorganisms	3.0	2.7	N/A
Bioenergetics	2.0	2.0	N/A
Microscopy	3.0	2.7	N/A
Nutrition of Microorganisms	3.0	3.0	N/A
Environmental Needs of Microorganisms	3.0	2.7	N/A
Growth of Bacteria	3.0	2.7	N/A
Cultivation of Bacteria	2.0	2.3	N/A
Enzymes	3.0	1.7	N/A
Fungi	3.0	2.3	N/A
Algae and Protozoa	2.0	2.3	N/A
Procaryotic cell structure	3.0	2.3	N/A
Reproduction of Procaryotic organisms	2.0	2.0	N/A
Identification of Viruses	3.0	1.7	N/A
Classification of Viruses	3.0	2.0	N/A
Sterilization and Disinfection	3.0	3.0	N/A
Antibiotics	3.0	3.0	N/A
Immunology	3.0	3.0	N/A
Infection	3.0	3.0	N/A
Microbiology of Soil	2.0	1.0	N/A
Microbiology of Foods	3.0	1.7	N/A
Microbiology of Dairy Products	3.0	1.3	N/A
Microbiology of Atmosphere	3.0	1.3	N/A
Industrial Microbiology	2.0	1.3	N/A
	97.		

C H E M I S T R Y 4105-06

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Matter	2.0	2.0	1.8
Elements and Compounds	2.0	2.5	2.5
Atomic Theory	2.0	2.0	2.8
Electronic structure	2.0	2.8	2.2
Periodic table	2.0	1.5	2.8
Nomenclature	2.0	2.8	1.8
Kinetics	2.0	2.0	1.3
Chemical Equations	2.0	2.5	1.8
Gases And Gas Laws	2.0	2.5	1.7
Water and Liquids	3.0	2.0	1.8
Solutions	3.0	3.0	1.8
Acids, bases, salts	2.0	2.8	2.0
Chemical equilibrium	2.8	2.0	2.2
Oxidation-reduction	2.0	2.5	1.8
Chemical bonding	3.0	2.0	2.5
Solid state	1.0	1.5	1.7
Electrochemistry	1.0	2.0	1.5
Thermochemistry	2.0	2.3	1.2
Nuclear chemistry	2.0	1.5	1.2
Formulas	3.0	2.5	2.2
Mole concept	3.0	2.8	2.0
Stoichiometry	1.0	2.8	1.8
Writing balancing equations	2.6	2.5	2.0
Graphical methods	3.0	2.0	2.2

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VocTech Directors</u>
Scientific method	1.0	1.8	2.7
Entropy concept	1.0	1.5	2.3
Organic chemistry	3.0	1.8	2.2
Biochemistry	3.0	1.8	2.2

ANATOMY & PHYSIOLOGY

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Organization of the Body	2.0	3.0	N/A
Cell Structure	2.0	2.5	N/A
Cell Function	1.9	2.3	N/A
Cellular specialization	1.8	2.5	N/A
Tissues of Nervous System	1.9	1.8	N/A
Nerve Impulse	2.0	2.3	N/A
Spinal cord	2.1	1.5	N/A
Spinal nerve	2.1	1.5	N/A
Brain	2.1	2.0	N/A
Cranial nerve	1.9	2.0	N/A
Senses	1.9	1.8	N/A
Endocrine system	1.9	2.8	N/A
Biomechanics	0.9	1.8	N/A
Skeletal system	1.8	2.0	N/A
Muscular tissue structure	1.2	1.5	N/A
Muscular tissue function	1.1	1.8	N/A
Respiration	2.4	2.5	N/A
The Heart	2.1	2.5	N/A
Blood circulation	2.4	2.8	N/A
Lymphatic circulation	1.9	2.5	N/A
Blood pressure	2.1	2.5	N/A
Types of body fluids	2.2	2.5	N/A
Digestive tissue	1.9	2.5	N/A
Digestive organs	1.9	2.8	N/A

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Process of digestion	2.1	2.8	N/A
Utilization of food	2.1	3.0	N/A
Regulation of body temperature	2.1	2.3	N/A
Reproductive systems	1.8	2.8	N/A
Gametogenesis	1.1	2.3	N/A
Genetics	1.6	2.0	N/A

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3101 & 3107

HOW MUCH EMPHASIS SHOULD BE PLACED ON THE FOLLOWING OBJECTIVES:

	<u>Allied Health Directors</u>	<u>Science Faculty</u>	<u>VoTech Directors</u>
Torque Wrench	0	N/A	1.5
Hook's Law	0	N/A	1.0
Density of Materials	2.0	N/A	1.5
Properties of liquids	1.0	N/A	2.2
Relationship between force and pressure	.5	N/A	2.2
Pressure measurements	.5	N/A	2.5
Buoyant forces exerted on objects by liquids	1.0	N/A	1.0
Pressure and the rate of flow of a liquid	0	N/A	1.5
Laser light	1.0	N/A	1.5
Optics	3.0	N/A	1.2
Properties of light	3.0	N/A	1.2
Laser Applications	1.0	N/A	1.2
Wave Length and Color	1.0	N/A	1.2
Electromagnetic Spectrum	3.0	N/A	1.2
Waves and communications	2.0	N/A	1.2
Line Spectra of gases	.5	N/A	1.3
Photons	2.0	N/A	1.2
Motions	1.3	N/A	1.5
Energy	2.0	N/A	2.2
Momentum	0	N/A	2.0
Atomic structure	2.0	N/A	2.0
Solids	1.0	N/A	2.0
Liquids	1.0	N/A	2.0

112

Allied Health
Directors

Science Faculty

VocTech
Directors

Gases and plasmas

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N/A

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Transmission of heat

1.5

N/A

3.0